Polyphasic Approach that Include MALDI-TOF Analyses for Filamentous Fungi Identifications

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Matrix-Assisted Laser Desorption/Ionisation Time-Of-Flight Mass Spectrometry (MALDI-TOF MS) emerged in the late 1980s as a sound technique to investigate the mass spectrometry of molecular high-mass of organic compounds through a soft ionisation of the molecules (Tanaka *et al.*, 1988) resulting in minimum fragmentation. Recently, MALDI-TOF MS technique has been contributed for a great increase of knowledge in the microbial identification/characterisation. The identification of species is an important goal in taxonomic microbiology. Information about each microorganism (*e.g.* morphological description, physiological and biochemical properties, ecological roles, and societal risks or benefits) is key element in this process (Lima *et al.*, 2008). Identifications can been a long and seemingly never-ended process with frequent revisions of the taxonomic schemes. These changes make identifications even more complicated for the non specialised researchers as each taxonomic group has specialised literature, terminology and characters (Santos *et al.*, 2008). This occurs to the extent that identifications can only be undertaken by a narrow group of scientists especially skilled in the "art". The concept of species is clearly abstract and delimitations are very difficult, and often not consensual. Taking this into account, microbial taxonomy (more evident in fungal taxonomy) and their associate data can often be best applied at the moment where the data are used a specific purpose: A pragmatic definition is "data fit for use". It is gradually becoming clearer that microbial identifications and authentication requires a polyphasic approach to generate quality data which are accurate and useful (Keys *et al.*, 2004). In reality this means that is necessary to combine the more traditional phenotypic and physiological approaches with modern molecular biology. Restriction fragment length polymorphism (RFPLs), random amplification of polymorphic DNA (RAPDs), amplified fragment length polymorphism-PCR (AFLPs-PCR), and DNA fingerprinting have all been used to distinguish microbial taxa that are difficult to characterise by traditional morphological means (Lima *et al.*, 2008). It is assumed that the genotype of the species is only an indirect indication of phenotype and ecological adaptation. In other words, microbial species are the smallest aggregation of population with a common lineage that share unique diagnosable phenotypic characters. Recently, microbial mass spectral analysis has been employed for phenotype typing (Erhard *et al.*, 1997; Gielen *et al.*, 2007). MALDI-TOF MS has been used to generate spectrum of protein masses in a range of 2000 to 20000 Da that is a taxon specific fingerprinting (Kallow *et al.*, 2006). The advantages of this novel approach as a microbial identification and authentication method are the simple sample preparation procedure, short time (few minutes) for analysis and reliability of the data and inexpensive (basically labour only) (Dickinson *et al*., 2004). Here, modern polyphasic methods that include MALDI-TOF technique for microbial identifications and authentications will be presented.

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